



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/584,310

06/23/2006

Koji Okazaki

TOW-151US

9817

959 7590 06/01/2009

LAHIVE & COCKFIELD, LLP
FLOOR 30, SUITE 3000
ONE POST OFFICE SQUARE
BOSTON, MA 02109

EXAMINER

LIUDAHL, KYLE

ART UNIT

PAPER NUMBER

4133

MAIL DATE

DELIVERY MODE

06/01/2009

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/584,310	Applicant(s) OKAZAKI, KOJI	
	Examiner KYLE LIUDAHL	Art Unit 4133	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-12 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 6/23/2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. ____. |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>6/23/2006</u> . | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

Preliminary Amendment

1. The preliminary amendment filed 9/06/2006 has been entered and fully considered. Claims 1-12 are pending.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

4. Claims 1-6 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kususe (JP 2002-190313, see machine translation) in view of Aakalu et al. (US Patent 3,741,292).

Regarding Claim 1, Kususe discloses a method of cooling a stack (abstract):

- stacking a plurality of unit power generation cells (30), each of said unit power generation cells (30) including an electrolyte electrode assembly (20) and a first separator (26) and a second separator (27) sandwiching said electrolyte

Art Unit: 4133

electrode assembly (20), said electrolyte electrode assembly including an anode electrode (22), a cathode electrode (23), and a solid polymer electrolyte (21) interposed between said anode electrode (22) and said cathode electrode (23);

- cooling said stack (1) by immersing in an electrically insulating liquid coolant (4) inside a stack container case (2);

Additionally, Kususe discloses the need of a heat exchanger to cool the coolant (abstract). Kususe does not explicitly disclose the configuration or mechanism of the heat exchanger, wherein:

- condensing, by a condenser (type of heat exchanger), the liquid coolant which has been vaporized at said stack container case by cooling said stack, and returning the condensed liquid coolant to said stack container case,

However, Aakalu discloses a cooling device for a heat generating electronic component, wherein:

- condensing, by a condenser (52, "vapor space" & 50, "internal fins"; C4/L23-25; Fig. 3), the liquid coolant (24, C4/L20-22) which has been vaporized at said stack container case (18, "container") by cooling said stack (10, "module"), and returning the condensed liquid coolant (24, C4/L20-22) to said stack container case (18).

Kususe and Aakalu are combinable because they are concerned with the same field of endeavor, namely the cooling of heat generating components.

It would have been obvious to a person having ordinary skill in the art at the time of the claimed invention to incorporate the condenser of Aakalu, into the system of

Art Unit: 4133

Kususe, to provide a means for condensation of the vapor produced from cooling the fuel cell.

Regarding Claims 2-5, Modified Kususe discloses all of the claim limitations as set forth above. Further Kususe discloses the fuel cell :

- wherein a solvent of fluorine compound ([0013]/Sentence 2 & 3) is used as the liquid coolant (4).

Additionally, Modified Kususe discloses the need for a two-phase liquid coolant with dielectric properties to cool the fuel cell but does not explicitly disclose the fuel cell wherein the liquid coolant is boiled into vapor in the nucleate boiling state, wherein a liquid having a boiling temperature lower than an operating temperature of said stack by 10°C to 25°C, or wherein the liquid coolant is supplied into said stack.

Regarding limitations recited in claims 2-5, which are directed to a manner of operating disclosed reactor, it is noted that neither the manner of operating a disclosed device nor material or article worked upon further limit an apparatus claim. Said limitations do not differentiate apparatus claims from prior art. See MPEP § 2114 and 2115. Further, it has been held that process limitations do not have patentable weight in an apparatus claim. See *Ex parte Thibault*, 164 USPQ 666, 667 (Bd. App. 1969) that states “Expressions relating the apparatus to contents thereof and to an intended operation are of no significance in determining patentability of the apparatus claim.”

Regarding Claim 6 & 11, Kususe discloses a polymer electrolyte fuel cell (abstract) including:

Art Unit: 4133

- a stack (1) formed by stacking a plurality of unit power generation cells (30), said unit power generation cells (30) each including an electrolyte electrode assembly (20) and a first separator (26) and a second separator (27) sandwiching said electrolyte electrode assembly (20), said electrolyte electrode assembly (20) including an anode electrode (22), a cathode electrode (23), and a solid polymer electrolyte (21) interposed between said anode electrode (22) and said cathode electrode (23);
- a stack (1) container case (2)
- wherein said stack (1) is immersed in an electrically insulating liquid coolant (4) inside said stack container case (2) to cool said stack (1);

Additionally, Kususe discloses the need of a heat exchanger to cool the coolant (abstract). Kususe does not explicitly disclose the required mechanism of the heat exchanger, wherein:

- a condenser (type of heat exchanger) provided in said stack container case;
- said condenser condenses the liquid coolant which has been vaporized at said stack container case by cooling said stack.
- a plurality of protrusions protruding toward said stack are provided on an inner surface of said stack container case, and said protrusions are exposed from the liquid surface of the liquid coolant.

However, Aakalu discloses a cooling device for a heat generating electronic component, wherein:

Art Unit: 4133

- a condenser (52, "vapor space" & 50, "internal fins"; C4/L23-25; Fig. 3) provided in said stack container case (18, "container");
- said condenser (52, "vapor space" & 50, "internal fins"; C4/L23-25; Fig. 3) condenses the liquid coolant (24, C4/L20-22) which has been vaporized at said stack container case (18, "container") by cooling said stack (10, "module");
- a plurality of protrusions (28, "fins", Fig. 1; C3/L8-18) protruding toward said stack (10, "module") are provided on an inner surface of said stack container case (18, "container"; C3/L9), and said protrusions are exposed from the liquid surface of the liquid coolant (C3/L39-43).

Kususe and Aakalu are combinable because they are concerned with the same field of endeavor, namely the cooling of heat generating components.

It would have been obvious to a person having ordinary skill in the art at the time of the claimed invention to incorporate the condenser of Aakalu, as taught by Kususe, to provide a means for condensation of the vapor produced from cooling the fuel cell.

5. Claims 7-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kususe (JP 2002-190313, see machine translation) in view of Aakalu et al. (US Patent 3,741,292), as applied to claim 6 above, and further in view of Tuma et al. (PG Pub 2006/0088746 A1).

Regarding Claims 7-9, Modified Kususe discloses all of the claim limitations as set forth above. Additionally, Kususe discloses the need to use electrically insulating materials that are in fluid communication with the coolant to prevent electrical

Art Unit: 4133

communication between, wherein polytetrafluoroethylene is used ([0019]/Sentence 2) but does not explicitly disclose coating the fuel cell stack case or condenser with a dielectric material such as polytetrafluoroethylene (PTFE) for the purpose of electrically insulating electrically-conducting components, wherein wherein coating is applied to at least one of a surface of said condenser and an inner surface of said stack container case.

However, Tuma further discloses coating electrically-conducting metal components with a dielectric material, wherein

- a polytetrafluoroethylene (PTFE) coating is applied to flow transfer layers ([0056]/L9-12)

Modified Kususe and Tuma are combinable because they are concerned with the same field of endeavor, namely the fuel cells.

It would have been obvious to a person having ordinary skill in the art at the time of the claimed invention to use PTFE to coat any metal component in fluid communication with the fuel cell, in this case the condenser and stack container case, for the purpose of preventing electrical communication .

Regarding Claim 10, Modified Kususe discloses all of the claim limitations as set forth above. Additionally, Kususe discloses the need to cool a direct immersion fuel cell (abstract & [0010]), but the reference does not explicitly disclose a fuel cell wherein:

- said stack includes a cooling plate having at least one groove for supplying the liquid coolant into said stack.

However, Tuma discloses a two-phase fuel cell cooling system wherein:

Art Unit: 4133

- said stack includes a cooling plate (172, 174; Fig. 3) having at least one groove (180, 184; Fig. 3) for supplying the liquid coolant into said stack [0074].

Modified Kususe and Tuma are combinable because they are concerned with the same field of endeavor, namely the cooling of fuel cells.

It would have been obvious to a person having ordinary skill in the art at the time of the claimed invention to incorporate the cooling channels in an immersion-cooled fuel cell of Tuma, as taught by Kususe, to cool a direct immersion fuel cell.

6. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kususe (JP 2002-190313, see machine translation) in view of Aakalu et al. (US Patent 3,741,292), as applied to claim 6 above, and further in view Kobayashi et al. (US Patent 4,036,291).

Regarding Claim 12, Modified Kususe discloses all of the claim limitations as set forth above. Additionally, Kususe discloses the need for a device in which vapor is condensed into liquid (abstract), but the reference does not explicitly disclose a fuel cell wherein:

- a trapping section for trapping the condensed liquid coolant at said condenser, and a circulation mechanism for allowing the liquid coolant to flow from said trapping section back to said stack container case.

However, Kobayashi discloses:

- a trapping section (36, 38, Fig. 5) for trapping the condensed liquid coolant (40) at said condenser (22), and a circulation mechanism (32) for allowing the liquid

Art Unit: 4133

coolant (40) to flow from said trapping section back to said stack container case (10).

Modified Kususe and Kobayashi are combinable because they are concerned with the same field of endeavor, namely the cooling of heat-emitting electrical devices.

It would have been obvious to a person having ordinary skill in the art at the time of the claimed invention to incorporate a liquid collection and return circulation section within a condenser of Kobayashi, as taught by Kususe, for the purpose of providing a means of cooling a fuel cell.

Double Patenting

7. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the “right to exclude” granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Art Unit: 4133

8. Claims 1-12 are provisionally rejected on the grounds of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-9 of copending Application No. 10/584390.

This is a provisional obviousness-type double patenting rejection.

Regarding instant claims 1-12, all the elements of the instant claims are claimed in the copending application, specifically 1-9, as the copending claims fully encompass the instant claims.

The copending application claims a fuel cell vehicle comprising a fuel cell stack, case, and condenser wherein the fuel cell stack is immersed in a liquid coolant within the case and further contains protrusions to facilitate nucleate boiling, which fully encompasses the instant claims. Moreover, claims 1-5 of the instant application concern a product-by-process, wherein all the elements of the instant claimed product-by-process, i.e. the fuel cell stack and case, are claimed in the copending application.

Conclusion

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to KYLE LIUDAHL whose telephone number is (571)270-1241. The examiner can normally be reached on Monday - Thursday, 7:30 AM to 5:00 PM (EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Basia Ridley can be reached on (571) 272-1453. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 4133

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

KBL

/Basia Ridley/
Supervisory Patent Examiner, Art Unit 4133